

WHAT IS CLAIMED IS:

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1. An optical disk device recording data on a recordable or rewritable optical disk, the device comprising:

zone storing means for preliminarily storing  
10 locations of a plurality of zones set by dividing a recordable or rewritable area of said optical disk from an inner periphery thereof to an outer periphery thereof;

position detecting means for detecting a  
15 position on said optical disk so as to record data at said position;

judging means for judging which of said zones said position corresponds to by referring to said zone storing means; and

20 controlling means for controlling the device to perform a data-recording by a CLV method to each of the zones specified by said judging means by setting a recording velocity and a recording power for each of the zones so as to enable the data-recording to provide an  
25 equal recording density to all of the zones.

2. The optical disk device as claimed in claim 1, further comprising:

first recording power determining means for determining the recording power in a first zone of said zones by performing an OPC (Optimum Power Calibration) in a test-writing area on said optical disk at a recording velocity preliminary set for said first zone, said data-recording being first performed to the first zone; and

second recording power determining means for determining the recording power in one of other zones of said zones by multiplying said recording power determined by said first recording power determining means by a predetermined constant.

3. The optical disk device as claimed in claim 1, further comprising:

pausing means for pausing said data-recording when said data-recording is performed to an end of one of said zones;

stabilizing means for stabilizing a revolving system of said optical disk so as to perform said data-

recording to a next zone of said zones at the recording velocity corresponding to said next zone when said pausing is performed, said data-recording being next performed to the next zone; and

- 5            restarting means for restarting said data-recording from a start of said next zone after said stabilizing is finished.

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4. The optical disk device as claimed in claim 3, further comprising timing means for timing said restarting by counting a frame sync clock obtained by  
15 reading the data recorded on said optical disk immediately before said pausing.

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5. The optical disk device as claimed in claim 1, wherein said data-recording is performed by one of a TAO (Track at once) recording mode and an SAO (Session at once) recording mode, and  
25            said zone storing means stores a boundary

between tracks on said optical disk as a boundary  
between said zones in said TAO recording mode, and  
stores a boundary between sessions on said optical disk  
as the boundary between said zones in said SAO recording  
5 mode.

10 6. The optical disk device as claimed in  
claim 1, wherein said data-recording is performed by  
packet-writing, and

said zone storing means stores a boundary  
between said zones in a link sector of a packet.  
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20 7. An optical disk device recording data on a  
recordable or rewritable optical disk, the device  
comprising:

first controlling means for controlling the  
device to perform a data-recording by a CAV method so as  
to provide a constant recording density;  
25 detecting means for detecting an occurrence of

a cause of a recording error;

pausing means for pausing said data-recording  
when said occurrence is detected; and

second controlling means for controlling the  
5 device to restart said data-recording by a CLV method at  
a second recording velocity not exceeding a first  
recording velocity immediately before said pausing so as  
to provide a recording density equal to said constant  
recording density when said pausing is performed.

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8. The optical disk device as claimed in  
15 claim 7, further comprising restarting means for  
restarting said data-recording by said CAV method upon a  
fulfillment of a predetermined condition when said  
pausing is performed,

wherein said second controlling means controls  
20 the device to restart said data-recording by said CLV  
method for the first time when said pausing is performed  
predetermined times.

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9. The optical disk device as claimed in claim 7, further comprising timing means for timing said restarting by counting a frame sync clock obtained by reading the data recorded on said optical disk  
5 immediately before said pausing.

10 10. The optical disk device as claimed in claim 7, further comprising:  
first recording power determining means for determining a recording power in a first zone by using a test-writing area on said optical disk at an initial  
15 recording velocity in performing said data-recording by said CAV method, said data-recording being first performed to the first zone; and

second recording power determining means for determining a recording power used in performing said  
20 data-recording by said CLV method by multiplying said recording power determined by said first recording power determining means by a constant predetermined according to said second recording velocity in performing said data-recording by said CLV method.

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11. An information processing device  
comprising:

an optical disk device recording data on a  
recordable or rewritable optical disk, the device

5 including:

zone storing means for preliminarily storing  
locations of a plurality of zones set by dividing a  
recordable or rewritable area of said optical disk from  
an inner periphery thereof to an outer periphery

10 thereof;

position detecting means for detecting a  
position on said optical disk so as to record data at  
said position;

judging means for judging which of said zones  
15 said position corresponds to by referring to said zone  
storing means; and

controlling means for controlling the device  
to perform a data-recording by a CLV method to each of  
the zones specified by said judging means by setting a  
20 recording velocity and a recording power for each of the  
zones so as to enable the data-recording to provide an  
equal recording density to all of the zones.

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12. An information processing device  
comprising:

an optical disk device recording data on a  
recordable or rewritable optical disk, the device

5 including:

first controlling means for controlling the  
device to perform a data-recording by a CAV method so as  
to provide a constant recording density;

detecting means for detecting an occurrence of  
10 a cause of a recording error;

pausing means for pausing said data-recording  
when said occurrence is detected; and

second controlling means for controlling the  
device to restart said data-recording by a CLV method at  
15 a second recording velocity not exceeding a first  
recording velocity immediately before said pausing so as  
to provide a recording density equal to said constant  
recording density when said pausing is performed.

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13. An optical disk recording method for  
recording data on a recordable or rewritable optical  
25 disk, the method comprising:



the position detecting step of detecting a position on said optical disk so as to record data at said position;

the judging step of judging which of a  
5 plurality of zones said position corresponds to by referring to location information stored preliminarily regarding said zones, the plurality of said zones being set by dividing a recordable or rewritable area of said optical disk from an inner periphery thereof to an outer  
10 periphery thereof; and

the recording step of performing a data-  
recording by a CLV method to each of the zones specified  
by said judging step by setting a recording velocity and  
a recording power for each of the zones so as to enable  
15 the data-recording to provide an equal recording density to all of the zones.

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14. The optical disk recording method as claimed in claim 13, further comprising:

the first recording power determining step of determining the recording power in a first zone of said  
25 zones by performing an OPC in a test-writing area on

said optical disk at a recording velocity preliminary set for said first zone, said data-recording being first performed to the first zone; and

- the second recording power determining step
- 5 for determining the recording power in one of other zones of said zones by multiplying said recording power determined by said first recording power determining step by a predetermined constant.

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15. The optical disk recording method as claimed in claim 13, further comprising:

- 15 the pausing step of pausing said data-recording when said data-recording is performed to an end of one of said zones;

the stabilizing step of stabilizing a revolving system of said optical disk so as to perform

20 said data-recording to a next zone of said zones at the recording velocity corresponding to said next zone when said pausing step is performed, said data-recording being next performed to the next zone; and

- the restarting step of restarting said data-
- 25 recording from a start of said next zone after said

stabilizing step is finished.

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16. The optical disk recording method as claimed in claim 15, wherein said restarting step controls a timing of said restarting by counting a frame sync clock obtained by reading the data recorded on said  
10 optical disk immediately before said pausing.

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17. The optical disk recording method as claimed in claim 13, wherein said data-recording is performed by one of a TAO (Track at once) recording mode and an SAO (Session at once) recording mode, and

said judging step judges which of said zones  
20 said position corresponds to by referring to location information stored preliminarily regarding said zones, the location information including a boundary between tracks on said optical disk as a boundary between said zones in said TAO recording mode, and a boundary between  
25 sessions on said optical disk as the boundary between

said zones in said SAO recording mode.

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18. The optical disk recording method as claimed in claim 13, wherein said data-recording is performed by packet-writing, and

10 said judging step judges which of said zones said position corresponds to by referring to location information stored preliminarily regarding said zones, the location information being stored in a link sector of a packet as a boundary between said zones.

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19. An optical disk recording method for recording data on a recordable or rewritable optical disk, the method comprising:

the first recording step of performing a data-recording by a CAV method so as to provide a constant recording density;

20 the detecting step of detecting an occurrence  
25 of a cause of a recording error;

the pausing step of pausing said data-  
recording when said occurrence is detected; and

the second recording step of restarting said  
data-recording by a CLV method at a second recording  
5 velocity not exceeding a first recording velocity  
immediately before said pausing so as to provide a  
recording density equal to said constant recording  
density when said pausing step is performed.

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20. The optical disk recording method as  
claimed in claim 19, further comprising the restarting  
15 step of restarting said data-recording by said CAV  
method upon a fulfillment of a predetermined condition  
when said pausing step is performed,

wherein said second recording step restarts  
said data-recording by said CLV method for the first  
20 time when said pausing step is performed predetermined  
times.

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21. The optical disk recording method as  
claimed in claim 19, wherein said second recording step  
controls a timing of said restarting by counting a frame  
sync clock obtained by reading the data recorded on said  
5 optical disk immediately before said pausing.

10 22. The optical disk recording method as  
claimed in claim 19, further comprising:  
the first recording power determining step of  
determining a recording power in a first zone by using a  
test-writing area on said optical disk at an initial  
15 recording velocity in performing said data-recording by  
said CAV method, said data-recording being first  
performed to the first zone; and

the second recording power determining step of  
determining a recording power used in performing said  
20 data-recording by said CLV method by multiplying said  
recording power determined by said first recording power  
determining step by a constant predetermined according  
to said second recording velocity in performing said  
data-recording by said CLV method.

23. A constant estimating method for estimating a constant used in an optical disk recording method for recording data on a recordable or rewritable optical disk, the optical disk recording method

5 including:

the position detecting step of detecting a position on said optical disk so as to record data at said position;

the judging step of judging which of a  
10 plurality of zones said position corresponds to by referring to location information stored preliminarily regarding said zones, the plurality of said zones being set by dividing a recordable or rewritable area of said optical disk from an inner periphery thereof to an outer  
15 periphery thereof;

the first recording power determining step of determining a first recording power in a first zone of said zones at the innermost periphery of said optical disk by performing an OPC in a test-writing area on said  
20 optical disk at a first recording velocity preliminary set for said first zone, a data-recording being first performed to the first zone;

the second recording power determining step for determining a second recording power in one of other  
25 zones of said zones by multiplying said first recording

power by said constant, the data-recording being performed to said one of the other zones at a second recording velocity; and

the recording step of performing said data-  
5 recording by a CLV method to each of the zones specified by said judging step by using one of said first recording velocity and said second recording velocity corresponding to each of said zones and one of said first recording power and said second recording power  
10 corresponding to each of said zones so as to enable said data-recording to provide an equal recording density to all of the zones, the constant estimating method comprising:

the OPC step of performing an OPC at said  
15 first recording velocity so as to calculate said first recording power in said first zone; and

the estimating step of estimating said constant by repeatedly performing a data-recording at a recording velocity obtained by being variously  
20 multiplied by a proper constant close to a value induced from a relationship that, when a recording velocity is doubled, a necessary recording power becomes  $\sqrt{2}$  times as large, and examining a recording state on said optical disk after the data-recording.



24. An information recording device writing information in a circumferential direction of a disk-type recording medium with a substantially constant linear density, the device comprising:

- 5           test-writing means for performing a test-writing in a predetermined area on said disk-type recording medium at a predetermined basic linear velocity so as to determine an optimum recording power at said basic linear velocity according to a result of
- 10 said test-writing; and
- recording-power setting means for setting a recording power according to a result of a predetermined calculation performed to said optimum recording power, when a recording is performed on said disk-type
- 15 recording medium at a linear velocity different from said predetermined basic linear velocity.

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25. The information recording device as claimed in claim 24,

- wherein said test-writing means includes optimum recording-state storing means for storing a
- 25 value in accordance with a reproduction signal

reproduced from said disk-type recording medium as an optimum recording-state targeted value, when a recording is performed on said disk-type recording medium with said optimum recording power; and

- 5               said recording-power setting means includes:  
                  recording-state targeted value setting means  
                  for setting a recording-state targeted value according  
                  to a result of a predetermined calculation performed to  
                  said optimum recording-state targeted value, when the  
10   recording is performed on said disk-type recording  
                  medium at the linear velocity different from the  
                  predetermined basic linear velocity; and  
                  power correcting means for correcting said  
                  recording power by comparing said recording-state  
15   targeted value with said value during a recording of  
                  information to said disk-type recording medium.

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26. The information recording device as  
claimed in claim 25, including operational  
expression/coefficient setting means for setting at  
least one of an operational expression and a coefficient  
25   performing said predetermined calculation, in accordance

with a type of said disk-type recording medium.

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27. The information recording device as  
claimed in claim 26, including medium-type judging means  
for judging the type of said disk-type recording medium  
according to an identification code embedded in said  
10 disk-type recording medium.

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28. The information recording device as  
claimed in claim 24, including record-pulse-width  
changing means for changing a record pulse width  
according to said linear velocity.

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29. The information recording device as  
claimed in claim 25, including record-pulse-width  
25 changing means for changing a record pulse width

according to said linear velocity.

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30. The information recording device as  
claimed in claim 26, including record-pulse-width  
changing means for changing a record pulse width  
according to at least one of said linear velocity and  
10 the type of said disk-type recording medium.

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31. The information recording device as  
claimed in claim 27, including record-pulse-width  
changing means for changing a record pulse width  
according to at least one of said linear velocity and  
the type of said disk-type recording medium.

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